
UNIT 7 PHYSICAL, MOTOR AND SENSORY DEVELOPMENT

Structure

- 7.1 Introduction
- 7.2 The Neonate
 - 7.2.1 The First Few Hours
 - 7.2.2 Capabilities of the Newborn
 - 7.2.3 Care of the Neonate
- 7.3 The Infant
 - 7.3.1 Sensory Capabilities
 - 7.3.2 Physical Development
 - 7.3.3 Motor Development
 - 7.3.4 Importance of Physical, Motor and Sensory Development
- 7.4 Maturational Basis and Environmental Influences on Physical, Sensory and Motor Development
- 7.5 Care of the Infant
 - 7.5.1 Feeding
 - 7.5.2 Health Care and Immunization
 - 7.5.3 Growth Monitoring
- 7.6 Summing Up
- 7.7 Glossary
- 7.8 Answers to Check Your Progress Exercises

7.1 INTRODUCTION

In the last Unit you read about the development of the foetus in the womb, the birth process and the care that the mother should take during pregnancy. In this Unit we will focus on the development that takes place during the first year of life in the area of physical, motor and sensory development. You will also read briefly about the care of the newborns and infants.

Objectives

After studying the Unit, you should be able to

- describe the sensory and motor capabilities of neonates
- enumerate the milestones of physical development during the first year of life
- identify the stages of motor development from birth to one year
- describe the sensory development during the first year of life
- explain how maturational and environmental factors interact to influence physical and motor development
- state the type of physical care needed by infants in terms of health and nutrition.

7.2 THE NEONATE

'Neonate' is a term used to refer to the newborn baby in the first month of life. When the child is born, she has to adjust to an environment which is very different from the one in the mother's womb. In the womb the foetus had a comfortable and protected existence—the temperature was controlled and so the foetus did not experience 'hot' or 'cold'; it was cushioned from physical shocks by the amniotic fluid; and it received nutrition from the mother. From this comfortable existence the baby is pushed out into an atmosphere

of relative discomfort. She is surrounded by air which may be cold or hot, dry or humid. She has to now cry to indicate that she is hungry or wet or uncomfortable. The cries of the infant are understood by the mother but this may not always be true. Thus we can see that after birth, the newborn has to make efforts to satisfy her needs and has to depend wholly on adults, usually the mother. But as you will read further you will see that the newborn has many capabilities which help her to adjust to the new surroundings.

7.2.1 The First Few Hours

A full-term baby, on an average, weighs about 2.8 kgs at birth. The skin of the newborn is usually covered with a white wax-like coating. Soon after birth this coating dries and begins to peel off. The skin is grayish or pink in colour and may be covered with fine hair which disappear during the first month. The newborn's head is large in proportion to the rest of the body. It may be slightly elongated due to labour and regains shape in the first few weeks after birth. Genitals in both boys and girls appear to be enlarged.

As soon as the child is born, there is a cry which results in the sudden intake of the life-giving breath of air. Sometimes the newborn may need to be patted on the back to make her cry. Breathing thus begins after the baby comes out from the mother's body. At birth the lungs of the neonate have some amniotic fluid which takes about a day or two to clear out. The baby's breathing in this period is, therefore, irregular and sometimes strained which may alarm an inexperienced mother. However, this is quite normal and does not indicate any illness. Coughing, sneezing and yawning help to clear up the air passages which enable the infant to survive.

After birth the child has to take in food through the mouth. Her lower jaw and cheeks are especially formed to suck. The chin and lower lip are receding, i.e. they slope backwards, and there are fat pads in the cheeks. This enables her to come close to the breast and suck, while still being able to breathe. The neonate's first elimination from the bowels is dark and sticky and is formed from the dead intestinal cells, mucous, fluid and materials swallowed by the baby while still in the uterus. The neonate does not have an efficient system to control body temperature and cannot produce heat to keep her body warm. Her system is equally inefficient at cooling the body. Therefore, one needs to keep the baby warm or cool depending upon the climate.

The neonate should be fed at the breast from the first day itself. This helps to induce and maintain secretion of milk. The milk secreted for the first two or three days is a thick yellowish fluid called colostrum which has a high protein content as well as certain substances that are good for the baby as they build resistance to disease. It is extremely important that the child has this milk.

Many times the mother and the child are separated immediately after birth to allow the mother to gain strength. However, recent research studies have shown that it is important for the baby to be close to the mother as soon as possible after birth. When the mother holds the baby in her arms, feeds her, gazes at her face and touches her, she experiences satisfying feelings and develops an emotional bond with the child. The baby too derives a feeling of security from this initial physical contact and this is important for her socio- emotional development as you will read in later Units.

7.2.2 Capabilities of the Newborn

The newborn is not helpless even though it may seem so. Contrary to belief she has many abilities. She is born with several well developed motor and sensory capabilities that help her to perceive, understand and adjust to the new environment. Let us first read about each of these by turn.

Motor Capabilities

The newborn can turn her head from side-to-side when placed on the back or the abdomen. When placed on the abdomen, she can also raise her head briefly. While on her back she can actively move her arms and legs. These movements help her to save herself from being smothered under blankets or sheets.

At birth babies are also capable of many reflex actions. Reflexes are automatic physical movements in response to a particular event or stimulus. In other words, they are involuntary physical actions. For example, if you stroke the corner of the newborn's mouth, her head turns towards the corner you are stroking, she opens her lips, puts out her tongue and tries to take the object in her mouth to suck it. This reflex is referred to as the rooting reflex. It can be seen before birth and disappears by three months after birth. The reflex is necessary for survival since it allows the newborn to reach for the breast or bottle. The second reflex associated with feeding, and thus important for the baby's health, is the sucking reflex. When something is placed in her mouth, she sucks at it. This reflex disappears some time after birth. In sleep, however, it can be seen till seven months after birth. When we say that the rooting and sucking reflexes disappear after some time it does not mean that the infant does not suck anymore. It means that sucking comes under voluntary control instead of being reflexive (involuntary). All the reflexes help the neonate to adjust to her environment and to survive. Some reflexes can be seen only for a short period. Others remain throughout the lifespan such as the automatic blinking of our eyes when something comes close to them or the automatic moving away of ones hand when it touches a hot object. Table 7(a) lists some reflexes that all healthy newborns have. Absence of any of the reflexes in the ages when they should be seen or their persistence after the age when they should have disappeared, indicate problems of the nervous system. Medical attention is needed in such cases.

Table 7 (a) : Some Reflexes of the Infant

Name of the Reflex	Description	Age of onset and disappearance
1) Rooting	described in the text above	
2) Sucking	described in the text above	
3) Swallowing	After sucking the infant swallows	Present at birth; later becomes voluntary.
4) Grasp	When pressure is applied on the infant's palm by placing something on it, she curls her fingers around the object and grasps it.	A 4-6 month foetus can be seen to exhibit the reflex; it is strong in the foetus at 9 months. It usually disappears by 2-3 months after birth. After this, grasping comes under voluntary control instead of being reflexive.
5) Babinski	If you stroke the baby on the sole of her foot, she first spreads her toes and then curls them.	Can be seen in 4-6 months foetus and disappears by 12-18 months after birth.
6) Moro	On hearing a loud sound or getting any kind of a physical shock such as when the support from the head is suddenly removed, the baby throws out her arms and arches her back.	Present in 7 month old foetus but not strong. It becomes strong after birth and disappears by the time the infant is 6 months of age.
7) Tonic Neck	If the infant's head is turned to one side, the arm and leg of that side extend while those on the other side bend.	It is seen in 2-3 month old infants and disappears by 6-7 months of age.

Sensory Capabilities

The neonate has various sensory capabilities. On the basis of many research studies, it is now known that the eyes, ears and other sense organs function in a remarkable manner from birth onwards. Neonates react to touch, heat and cold and can distinguish certain sounds, tastes and smells. Let us read about these in detail.

Vision : This is the most developed sense at birth. The newborn's eyes are sensitive to light. If placed in a dark room, her eyes search actively for light and if she finds a source of light, she continues to look at it. The light, however, should be bright. This means that she can differentiate between light and dark.

Immediately after birth, the baby can follow a moving object with her eyes. The object should be moderately bright and should move slowly. The newborn is attracted by things that move, produce sound and those which have a light and dark contrast. The human face has all these characteristics and it greatly attracts the newborn. When the caregivers interact with the child, their eyes and mouth move frequently. The eyes, in addition, have a light and dark contrast. In fact, the newborn baby continuously scans her surroundings and when she sees an object she gives it a good deal of attention. The child thus seems predisposed to look around and examine the world. She may not understand all that she sees, but she is building up a store of experience which will help her in learning later.

The neonate can see objects and people clearly when they are at a distance of eight to ten inches from her face. This is usually the distance between the adult's and the baby's face as the baby is held in the arms. Thus during these interactions the baby can clearly see the caregiver's face and gets an opportunity to examine it. This is the way in which the baby learns to recognize the people around her. This mutual gazing also helps to establish an emotional bond between the child and the caregivers.

Hearing : From the time of birth babies respond to sound. This is evident from the fact that they turn their head towards the direction of the sound source. However, they cannot hear as well as, for example, a one year old child. They can hear only moderately loud sounds. Different levels of sounds have different effects on the child. Loud noises distress the babies and they get startled and begin to cry. Soft sounds soothe them. They are most responsive to human voice as compared to any other sound and are said to respond more to high-pitched voices (female) compared to low pitched voices (male). The newborn's preference for human speech is reflected in the fact that they move their arms, legs and body in rhythm to the caregiver's speech as early as twelve hours after birth. If the pace of the adult's speech is fast, the movements of the neonate become fast. If the rhythm of the speech slows down, so do the child's movements.

While it will take the infant another three months to distinguish the mother's face from other people's faces, she can discriminate the mother's voice from other female voices in the very first week of birth. This is probably because the baby has been hearing the mother's voice while in the womb and is already familiar with it.

Taste, Smell and Touch: The senses of taste and smell are also well developed in the newborn. Neonates can distinguish the four basic tastes: sweet, sour, salt and bitter. Research indicates that newborns prefer sweet things as they suck more on a nipple from which they get sweet water than on one from which they get plain water. On being given salty water, they reduce sucking. As regards the sense of smell, the baby turns her head away from any unpleasant odours as early as the first day after birth. Babies who are breast-fed appear to be able to recognize the smell of the mother's breast as early as in the first week. Newborns respond when touched on any part of the body. They are especially sensitive to touch on the mouth, face, soles of the feet and the palms.

The Newborn's Routine

Besides knowing about the motor skills and sensory capabilities of the newborn, it is also important for us to know what she does in a day. Does she sleep all the time or are there periods when she is active and alert? Such understanding will help the caregiver to know what can be expected from the newborn and she will be able to look after the baby better.

The neonate sleeps for about 16-18 hours in a day and is alert and active for about 6-8 hours. If you have observed an infant under the age of one month closely, you would have noticed that she has different levels of activity at different times of the

day. Most neonates move from deep sleep to lighter sleep and then they begin to wake. Crying indicates hunger and on being fed the infant quiets and becomes alert and active. When alert, she looks around her and pays attention to the caregivers if they interact with her. Then she becomes drowsy again and falls asleep. This cycle of activities repeats itself about every two hours. **An important implication of this cycle for the caregivers is that the best time for interaction with the infant is just after she has been fed and is active.**

Many common behaviours can be observed in neonates. You have read about some of them in the preceding sections: they cry when hungry, suck on a nipple, follow a moving object and show a distinct cycle in the pattern of activity. However, you must remember that there are individual differences in their behaviour. They differ in the rate and pattern of activity, sleep and feeding schedule as well as emotional disposition and social interaction. Some neonates cry more than others and are fussy, requiring more attention on the part of the caregiver to soothe them. Some are quiet and sleep for longer periods compared to others and some are more alert.

7.2.3 Care of the Neonate

All babies are different and need different kind of care from parents. However, certain aspects of care are common to all babies and must be kept in mind. In this section you will read about these aspects.

As far as possible the neonate should be breast-fed. Breast-feeding is an essential part of the mother-child relationship. It provides the child with a secure and pleasant feeling and promotes attachment between her and the mother. You will read in detail about the development of attachment in Unit 10. During the first month of life, the baby can suck only small amounts of milk. Therefore, she should be fed whenever she is hungry and cries. She will need to be fed 6-8 times in a day at intervals of 3-4 hours. For the first three to four months, mother's milk is sufficient for the infant as it meets all the nutritional requirements of the body. Water must also be given to the infant. The quality of breast milk will depend upon the mother's health and the quality of food eaten by her. It is, therefore, important for the lactating mother to eat well. She must keep the child clean, particularly the region of the umbilicus, in order to prevent infection of the area. If the baby is being bottle-fed then certain points have to be kept in mind. These are as follows:

- The quality/consistency of the milk should be checked to ensure that the child is getting enough nutrition. The milk should not be so dilute that it does not meet her nutritional needs. It should also not be too concentrated or else it will be difficult to digest.
- The nipple and bottle should be kept clean and covered to avoid infection.
- The infant should be held while feeding and spoken to, instead of propping the bottle in her mouth and leaving her alone. Holding the child makes her feel loved and secure.

Besides attending to the infant's physical needs, the caregiver must spend time with her. Talking to the baby, gazing and smiling at her and touching her will help her to become familiar with the caregiver. Even though the neonate does not talk or smile back, you know that she attends to the person who interacts with her — she looks at her face and moves her body in response to her attention. Through such experiences her mind develops. **Interacting with the child from the time she is born is necessary to foster development in all areas.**

Check Your Progress Exercise 1

- 1) Read the following statements carefully and state whether they are correct or incorrect.
 - a) 'Neonate' is a term used to refer to the baby between birth and six months of age.

- b) The newborn is not helpless. She can see, hear, smell, move her arms and legs and cries to attract attention.
 - c) Breast milk provides all nutrients the child needs and breast-feeding is important for the mother-child attachment.
 - d) Neonates can see clearly at a distance of '8-10' inches.
 - e) Neonates can discriminate the mother's voice and other female voices as early as the first week after birth.
 - f) Absence of any reflex in the ages when it should be there or its persistence for longer than necessary, indicates problems of the nervous system.
- 2) Match the statements in column I with those in column II:

COLUMN I	COLUMN II
a) Moro reflex	i) When touched on the cheek, the child turns towards the touch and seeks something to suck on
b) Grasping reflex	ii) If the infant's head is turned to one side, the arm and leg on that side extend while those on the other side bend.
c) Tonic neck reflex	iii) On hearing a loud sound or receiving a physical shock, the infant throws out her arms and arches her back.
d) Rooting reflex	iv) When pressure is applied on the infant's palm, she curls her fingers and grasps the object.

7.3 THE INFANT

During this period growth and development in all areas is rapid. Sensory capacities of hearing, sight, smell, taste and touch develop rapidly. In this section you will read in detail about physical, motor and sensory development of the child till one year of age.

7.3.1 Sensory Capabilities

In the earlier section you read about the sensory capabilities of the newborn. These are the tools which help her to adjust to her immediate surroundings. But she has to do more than this. She has to judge the direction and distance of the sound source. She has to understand that a specific voice and face belong to one person. She has to learn to pay attention to detail and discriminate between two similar looking things. She has to develop the ability to focus on things that are essential. She also has to be able to distinguish sounds and learn speech. She must explore the environment to learn about it. All this depends on the development of the senses. Let us look at what the infant accomplishes in the area of sensory development in the first year.

Vision : By the time the infant is two months, her brain develops further and the ability to focus on objects improves. She is able to see objects, whether they are near or far. This makes it possible for her to observe toys placed near her and to reach for them. Being able to see the objects that are farther away clearly, allows the baby to recognize objects and people when they are at a distance.

By the time infants are two to three months old, they pay attention to the details of objects. This helps them to discriminate among things. They seem to be able to distinguish familiar objects from unfamiliar ones. Infants at three months of age can tell their parents' faces from those of others. They can also see colours.

Research has shown that by 5-6 months of age, most infants can discriminate between different emotional expressions on the mother's face such as sadness, fear, joy, alarm or surprise and they respond accordingly. If, for example, her face shows

alarm, the child also gets scared and may begin to cry. This ability is a remarkable achievement for the infant. It implies that she judges the expression on the person's face and understands its meaning. Being able to discriminate emotions and recognize people helps in social interaction.

Thus we see that the child refines her visual capacities greatly over the first year. Development of the child's visual abilities is necessary for all aspects of functioning.

Hearing : You have read that the neonates can orient to the approximate direction of the sound. During the first few months of life, infants attend to different sound sources. By six months they are usually able to judge the direction of the sound source correctly. Much before this, when they are a month old, they can discriminate between different sounds such as a bell ringing, the grandmother singing or a knock on the door. Infants are also responsive to rhythm. They are soothed by rhythmic sounds such as music or ticking of the clock. Very loud sounds cause distress and they respond by flailing their arms and legs and crying.

You have read that the neonate is able to distinguish the mother's voice from other voices as early as the first week of life. Gradually, the infant learns to distinguish other people's voices as well. By six months she has understood which face goes with which voice. This is clear from many research studies. For example, when the infant was put in a situation where she could see both her father and mother but hear a tape-recorded voice of only one of them, she would look towards the parent whose voice she heard. The infant also understands that there is a relationship between the movements of the lips and the sounds that emerge. You have seen that infants respond to sounds from the time they are born. This is important for the development of speech. You will later read more about this aspect in Unit 9 on language development.

Smell, Taste and Touch : These three senses are more developed than is commonly believed. As the child grows, these senses become more finely tuned and she is able to detect and respond to more subtle differences in the stimuli.

7.3.2 Physical Development

You can see physical changes in the infant from one week to the next, the most obvious being the gain in height and weight. By the time the child is one year old, weight is three times the weight at birth, i.e. she weighs about 8 to 9 kgs. On an average the baby grows about 10 to 12 inches in length in the first year.

Most of the nerve cells of the brain are present at birth. In the first years the connections between them develop and increase in number. The cells also grow in size. These changes in the brain and nervous system are enormously important though they cannot be seen. The first two years are crucial for the development of the brain and nervous system.

The shape and proportion of the body change considerably in the first year. The neonate has a large head, narrow shoulders and short legs. As the legs and the torso grow in the first year, the body looks more proportionate. The bones, which are soft and flexible, harden in the period of infancy and the muscles increase in size.

All these physical changes – increase in height, weight, development of the brain and nervous system and muscle tissues, the hardening of bones and changing proportions of the body – make the development of motor skills possible. Physical development enables the infant to sit, stand, walk, grasp objects, throw them and catch them. We now read about the motor skills that infants acquire in the first year of life.

7.3.3 Motor Development

If you have observed infants over a period of time, you will have some idea about the sequence of emergence of motor abilities. The development of motor skills can be discussed under the categories of gross and fine motor skills. Gross motor skills

which require the coordination of large (gross) muscles of the body such as of the shoulder, elbow, hip and back. Running, walking, climbing, throwing, and catching require the use of large muscles. Fine motor skills are those in which the small muscles of the body are used such as those of the wrist and fingers. Picking up or grasping objects, writing and painting are examples of fine motor skills. Basic accomplishments in the area of motor development are achieved during the first year and a half of life. Let us read about the development of gross and fine motor skills in the first year.

During the first three months the baby can move her arms and kick with the legs on her back or stomach. She can roll her body a bit from side-to-side. Because of the tonic neck reflex the infant mostly looks at the side to which her arm is extended. She cannot look at objects suspended overhead since she cannot hold her head in the midline as yet.

By the third month, the baby can lift up her head as well as her chest while on her stomach. She can also hold her head up steadily in one position for some time. Now she can also hold her head in the midline while lying on her back and is able to look at objects directly above her. She is able to move her arms and legs more vigorously. She tries to swipe at objects. Swiping means hitting at objects with the whole hand without being able to grasp them. Toys should be placed within reach of the child. Sometimes the child while swiping manages to touch the object. To reach for an object one needs to coordinate seeing with the movement of the hand, so that the hand reaches for the object where one sees it. That the infant tries to reach for an object she is looking at and manages to touch it reflects increasing eye-hand coordination. The infant cannot as yet grasp an object in her palm. Grasping requires the use of the muscles of the hand (fine muscles), while reaching and swiping uses the muscles of the shoulder and elbow (gross muscles). In keeping with the head-to-end principle of development, the infant only later learns to use the fingers of her hand to grasp an object.

You think of some gross motor skills that the child acquires in the 4-6 month period? During this period the infant is able to roll over from her stomach to her back and a little later from back to stomach. At this time the mother must be careful not to leave the infant unattended as she could fall off the bed. The 5-6 month old when pulled from a sitting to standing position can support her own weight and needs support to prevent from falling over. By six months she can sit up without support. In another month she does not need support while sitting. She is also better able to coordinate the movements of her arms and acquires fine motor skills. Now she is able to grasp objects. She holds one hand with the other and brings them both to the mouth to suck. Any object in the hand is so treated. A little later she is able to open her palm, drop the object she is holding and take another that is being offered to her. This also makes for greater interaction between the child and the mother. They can play games that involve giving and taking objects. After the child has mastered this skill at six months, she learns to transfer an object from one hand to the other and pick up another object with the first hand. This shows an increasing control over the muscles of the fingers. She is now also able to shake the object she is holding and enjoys rattles.

The eight-month-old is usually able to sit up from a lying position by herself. She moves from lying on her buttocks while lying down and makes vigorous movements of arms and legs to reach objects around her. Between seven and nine months the infant is able to move on her hands and knees with the abdomen raised off the floor, i.e. she begins to crawl. Once the infant accomplishes this, she begins to pull herself to a standing position while holding on to something. Sometimes she lets go of the support and falls to the floor. The eight-month-old can stand steadily for a short time if there is a person to hold her. After some weeks the infant begins to touch the floor by bending her knees and waist. The one-year-old can walk if someone holds her hand. At one year some children can walk by themselves, though most do not until between 13 and 15 months.



Fine motor skills also develop in the seven to twelve months period. The grasp of the infant improves. The seven-month-old can rake at small objects with her fingers but cannot yet pick them up. This requires coordination between the thumb and the forefinger. This ability develops by eight months and she can pick up something to eat from her bowl. She can also turn an object in her hands. By 9-12 months the infant uses one hand to hold an object and brings the other hand to manipulate it. At one year the infant is able to throw things, which reflects increasing muscle coordination. The development of gross and fine motor skills helps her to explore her environment. Things which are harmful and breakable now need to be put out of reach of the infant.

The sequence of emergence of gross and fine motor skills has implications for the play activities that you plan for a child in this age group. You will read about the activities for fostering physical and motor development in Unit 11.

7.3.4 Importance of Physical, Motor and Sensory Development

In what ways do physical, motor and sensory abilities help the child? **Firstly, with the increasing motor skills, rapid physical growth and refinement of sense organs, the child's range of activity increases.** She has greater freedom of movement and can do more things. She can reach for objects, manipulate them in different ways and go to people instead of waiting for them to come to her. The rapidly developing brain helps her to understand and learn from the events around her. It is a common sight to see a baby pick up a new toy and show it to her mother who may talk to her about it. In this way the infant learns, forms ideas about objects around her and attends to language.

Secondly, as the child begins to master new skills, she also develops positive feelings about herself. She feels she can do many things and control some events. For example, she knows that she can reach for an object at a distance from her, pick it up and play with it. From these small events emerge the feelings of confidence and independence. The foundation of self-concept is being laid now.

Thirdly, the changing physical, motor and sensory skills of the infant also influence the way people respond to her and the nature of interaction between them. Thus it influences the infant's social relationships.

- 1) The following are some gross motor, fine motor and sensory abilities. They are not written in the order that they develop in the infant. Indicate their order of emergence. For example, under the column of gross motor skills, the skill numbered (iii) is the first to develop. So in the bracket beside it, write (1) as indicated

a) GROSS MOTOR SKILLS

- i) Sits with support. ()
- ii) Crawls and pulls herself to a standing position while holding onto something. ()
- iii) Holds head in midline and can hold her head up steadily in one position for some time. (1)
- iv) Throws things coordinating the arm, wrist and finger. ()

b) FINE MOTOR SKILLS

- i) Picks small objects using fingers and thumb. ()
- ii) Opens palm and drops object in hand and takes another being offered to her. ()
- iii) Rakes at objects. ()
- iv) Grasps object and transfers it from one hand to another. ()

c) SENSORY ABILITIES

- i) Matches the parents' voice to face. ()
- ii) Can tell parent's face from strangers. ()
- iii) Distinguishes the mother's voice from those of others. ()

- 2) Briefly state how physical, motor and sensory development affect the infant's development?

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7.4 MATURATIONAL BASIS AND ENVIRONMENTAL INFLUENCES ON PHYSICAL, SENSORY AND MOTOR DEVELOPMENT

Do you recall reading about the influences on development in Unit 3? You had read that heredity (or biological) and environmental factors interact to influence

development. Let us briefly recapitulate the discussion here. Physical, motor and sensory development has a strong maturational basis (i.e. biological factor). You know that physical characteristics like height, weight and the child's appearance are to a large extent determined by heredity, though the environmental factors may influence them to some extent. There are innate constitutional differences among children. You know that children cannot acquire a motor skill before they are biologically ready to do so and this accounts for the universal pattern in motor development. The genes control the time of maturation of a particular part of the body. However, you also know that opportunities to practise, the infant's diet and the kind of care (i.e. environmental factors) are equally important in the development of motor skills. As the muscles, bones and nerves develop, the infant practises the movements which in turn foster growth. Unit 11 describes the play activities that will promote sensory and motor development.

7.5 CARE OF THE INFANT

You have read in Unit 4 that the needs of love, nurturance and stimulation must be fulfilled for healthy development of the child. Units 10 and 11 of this Block will talk about the emotional relationship between the caregiver and the child and how the caregiver can provide stimulating experiences to her. In this subsection, we will talk about the kind of physical care that the infant needs. This is important as infants are delicate and prone to illnesses and special care must be taken to protect them. They need adequate nutrition. They must be immunized regularly and their growth checked periodically.

7.5.1 Feeding

You have read that the newborn takes in only a small quantity of milk at a time. As the baby grows, she is better able to coordinate swallowing with sucking. She can now take in more milk. She also begins to sleep through the night and feeds 5-6 times a day.

By four months of age the baby requires more nutrients than milk alone can supply. Now she must be given food other than milk. In other words, supplementary feeding should begin. Of course, the breast or the bottle milk continues though the number of feeds will decrease. Supplementary feeding should begin with liquids. The baby can be given fruit juice or vegetable soup. To begin with, the juice should be diluted with boiled water and only a few teaspoons should be given at a time. Vegetable soups can be made by boiling the vegetables in water and adding a little salt and then straining it. If the baby does not accept a particular food, do not force her but try again after some days. Only gradually will she develop a taste for different foods.

By the time the infant is six to eight months of age, she can be given semi-solid foods, i.e. mashed foods. At this time she can digest soft foods like boiled and mashed vegetables and mashed or stewed fruits. She can be given foods like minced meat, mashed fish or soft boiled egg. Cereals and pulses in the form of porridge made in milk can be given. You can add mashed vegetables and fruits to the porridge to make it wholesome. The infant should be given supplementary feeds at least three to four times a day. Breast milk can continue till the child is 12 to 15 months. This is also the period when the infant starts teething. Some crisp foods like biscuits, rusks or carrot slices will be enjoyed by the baby at this time as they will help exercise her gums.

Between eight and twelve months the first two teeth appear. At the age of one year, most children have six to eight teeth. By the time the child is one year old she begins to enjoy nibbling at everything that the family eats. She can also eat larger quantities. Highly spiced or fried foods should be avoided. Some babies accept solid food easily. Others may resist it. Infants differ greatly in their acceptance of supplementary food and the caregiver needs to be sensitive to the child's preferences.

While introducing supplementary foods some cautions have to be kept in mind.

- Foods should be introduced in small quantities since the infant is not used to them. Over the first few days, one or two spoons of the food is enough. After the child's system has adjusted to this, the amount can be increased gradually, over a period of a month, to half a cup at one time.

- New foods should be introduced one at a time. When the child has accepted and adjusted to one food, then the other should be introduced.
- The food should neither be too hot nor too cold when given to the baby.
- Foods like fruits and vegetables with skin, whole cereals and pulses should not be given initially because they have too much fibre content and the infant cannot digest them.
- Hands and utensils should be kept clean while cooking the food and feeding the baby.
- Fresh foods like fruits should be washed well.
- A time schedule should be maintained for feeds but the child should not be forced to eat.

Feeding time is also a time when the caregiver interacts with the child. She talks to her and playfully feeds her. This strengthens the emotional bond between them. It is important to make feeding and related activities a happy experience for the infant.

7.5.2 Health Care and Immunization

Many children in our country die during the first year of life. The common causes are tetanus and infections of the respiratory and gastrointestinal tract. Most of these can be prevented through immunization. All children must be inoculated against diphtheria, whooping cough, tetanus, poliomyelitis, tuberculosis, measles, and mumps. Table 7(b) gives the ages at which the child must be immunized. This schedule must be followed to prevent infections.

Table 7 (b) : Immunization Schedule

Age	Immunization
Months	
At Birth	BCG and Poliomyelitis oral drops
1½ Months	DPT, Poliomyelitis oral drops
2½ Months	DPT, Poliomyelitis oral drops
3½ Months	DPT, Poliomyelitis oral drops
9-12 Months	Vaccine for measles

During illness the child's diet needs attention. As far as possible the quantity of food the child takes should not be reduced or stopped. If the infant is young and on breast milk only, then breast feeding should continue. If the older infant is being given supplementary foods she should be given soft and mashed foods which are easily digested. The feeding pattern should be close to normal.

One illness which is very common, and can be fatal if the child is not given proper care, is diarrhoea. A little care at home can ensure survival. In this illness the child has loose motions and as a result there is loss of water, salt and minerals from the body. This causes dehydration which may be fatal. This can be prevented by giving the child a rehydration solution which can be prepared at home, it can be made by adding a pinch of salt and one large spoon of sugar to one glass of boiled water. This should be given to the child at regular intervals in small quantities. You will read more about health care of the child during illness in Course 2.

7.5.3 Growth Monitoring

To ensure that the child is growing according to the norms for her age, her growth has to be checked from time to time. Monitoring the growth pattern of children helps to detect growth failure at an early age. Growth monitoring is necessary since a large majority of children in the country do not get adequate food and fall ill frequently. One out of three children suffer from some degree of growth retardation. In most programmes for young children, the growth of children is monitored to assess their health.

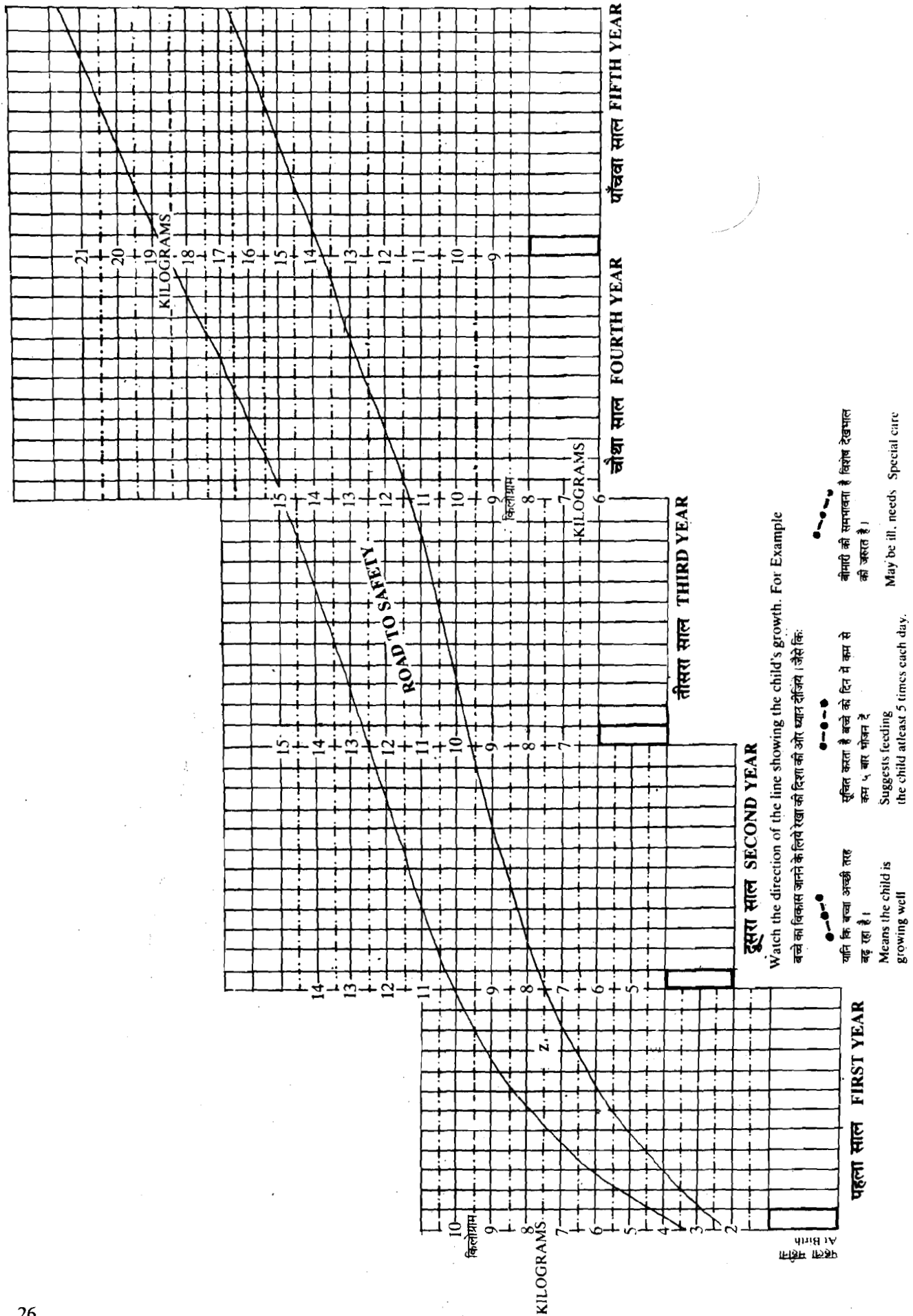


Fig. 7.1 Growth Chart

There are several ways of monitoring growth. One of the best indicators is the child's weight. A healthy infant gains weight steadily. With age the child's weight must increase. Based on observations of several children, experts have specified how much a child should weigh every month from the time she is born. A weight lower than normal makes the child weak and prone to infections. Being overweight may also be detrimental for the child's health. Taking the weight-for-age as the basis, experts have prepared a growth chart. By checking the infant's weight against this chart, one can find out whether or not her growth is according to norms.

To understand how a growth chart is to be used, refer to the growth chart given in Figure 7.1. In a growth chart the age is plotted on the X-axis and the weight on the Y-axis. To find out the health status of any child take her exact age and mark it on the X-axis. Suppose the child is nine months old. Then weigh the child and mark this weight on the Y-axis. Suppose the child's weight is 7.5 kgs. Then from the point where you have marked the child's age, draw a line parallel to the Y-axis and from the point where the child's weight is marked, draw a line parallel to the X-axis. Extend these lines until they meet. Call this point 'Z'. This has been marked on the growth chart on the preceding page. You will notice that there are two lines on the growth chart. The area between these lines is called the 'road to safety'. If the point 'Z' falls in this area, the child is healthy. If the point 'Z' lies below the lower line, the child is not healthy and needs to gain weight.

As you will plot the child's weight every month, you will get a series of points. Join these points and see the direction of the line. If the line moves upwards () this means that the child is gaining weight each month and her growth is normal. If the line is straight () it means that the child has not gained weight. The child in such a situation must be given nutritious meals 5-6 times a day. If the line moves downwards () it means that the child is losing weight. This is dangerous and the child needs special care and the attention of a doctor.

Check Your Progress Exercise 3

- 1) In the space provided below, write how heredity and environment influence physical and motor development.

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- 2) Read the following statements carefully. Write whether they are 'correct' or 'incorrect' in the brackets.

- a) The infant should be breast-fed-till $1 - 1\frac{1}{2}$ years of age. ()
- b) Supplementary food should be given when the infant is 4-5 months old. ()
- c) First dose of DPT, BCG and poliomyelitis drops should be given at five months of age. ()
- d) To prevent dehydration during diarrhoea, the child should be given a sugar and salt solution in boiled water. ()

- 3) Below are given the weights of three children over the period of the first year. Plot their weight on the growth chart (figure 7.1) and comment on the health status of each child in the space provided.

	CHILD A	CHILD B	CHILD C
1 month	3.0 kg	2.8 kg	2.5 kg
2 months	4.5 kg	3.5 kg	3.0 kg
4 months	6.0 kg	5.0 kg	4.0 kg
6 months	7.5 kg	6.0 kg	4.5 kg
8 months	9.0 kg	7.5 kg	4.5 kg
10 months	9.5 kg	8.5 kg	5.0 kg
12 months	10.5 kg	9.0 kg	5.5 kg

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7.6 SUMMING UP

In this Unit you read about physical, motor and sensory development in the first year of life. You learnt how the neonate adapts and adjusts to her environment. The newborn is not helpless. She has fairly well developed sensory capabilities – she can see, hear, smell, taste and feel touch. Her cheeks and jaws are also specially formed to suck. The infant is born with a collection of involuntary responses to stimuli, referred to as reflexes, and these help her to survive.

The neonate can see objects clearly when they are at a distance of 8-10 inches from her face. She can recognize the mother's voice in the very first week after birth.

The baby should be fed on breast milk from the first day of life, not only because it meets her nutritional requirements but also because it helps in the development of an emotional bond between the mother and the child. The diet of the lactating mother should also be given due attention.

By the time the child is one month old, she has adapted to her environment and rapid development takes place in all areas. The infant gains in height and weight. At the end of one year the child weighs 8-9 kgs and gains 10-12 inches in height. The development of the brain is rapid and this period is crucial for development of the nervous system. At birth, the baby's head is big in proportion to the rest of her body. Over the first year this proportion also changes. The legs and torso grow in size, the bones harden and the muscles develop. These developments help the infant to acquire motor skills.

During the first year the infant learns to control the movements of her head, arms, legs and acquires various motor skills. She learns to roll over on her back, sit, crawl, stand and then walk. She also learns to coordinate the movement of her head and eyes and thus grasps things, carries them to her mouth, transfers them from one hand to another and gradually learns to pick and manipulate small objects.

The infant's sensory abilities also develop. She is able to differentiate between various objects and identify emotions on the mother's face. The ability to judge the direction of sound also improves. She learns to discriminate between various sounds which will help her to learn language. The development of physical, motor and sensory abilities is crucial for development in other areas.

Physical growth is, to a large extent, determined by maturation. At the same time, opportunities to practise motor skills are also important. The caregiver has an important role in that she must plan and conduct activities to promote sensory and motor development.

Infants should be immunized regularly and their growth should be periodically checked using growth charts. Supplementary food should begin when the child is around four months old. Breast-feeding should preferably continue till the child is 12 to 18 months.

7.7 GLOSSARY

Dehydration : the loss of water from the body to an extreme extent.

Detrimental : Harmful, damaging, destructive.

Distress : to cause discomfort; upset badly.

Emotional Disposition: a person's temperament or nature.

Ingest: to take food or liquid into the body.

Perceive : to be aware of any outside stimulus, like the sound of traffic on the road. When the neonate hears a sound and reacts to it, we say that she is able to perceive that sound.

Pitch : is related to the auditory property of sound tone.

Pivoting : to turn on one point or in one place. As used in the text it means that the infant tries to move by turning on her buttocks.

Sensory Capabilities : sensory refers to anything related to the senses. In the text, sensory capabilities means the ability to see, hear, feel, smell and taste.

Smothered : suffocate; to be covered in such a way that it is difficult to breathe; choke.

Swipe at : to hit hard with a sweeping blow. In the text the term refers to the infant's attempt to reach out for objects. Since she is unable to coordinate eye-hand movements to pick up objects, she swings her arms randomly while trying to pick the objects. In other words, she swipes at them.

To rake at : a rake is a fork-like tool used for gardening. When we say that the infant can rake at small objects we mean that she tries to scrape or gather or collect small objects by curling her fingers stiffly like a rake.

Voluntary : the term 'voluntary' is used when someone performs an action or does something willingly. We have talked about the rooting reflex in a neonate, i.e., she will suck on anything that is placed near her mouth or cheek. After a while the infant will suck only when she wants. When this happens we say that sucking has become voluntary.

7.8 ANSWERS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress Exercise 1

- 1) a) False. 'Neonate' is a term used to refer to the baby between birth and one month of age.
b) True, c) True, d) True, e) True, f) True
- 2) a) (iii), b) (iv), c) (ii), d) (i)

Check Your Progress Exercise 2

- 1) a) GROSS MOTOR SKILLS
 - i) (2) around six months
 - ii) (3) by 7-9 months
 - iii) (1) by three months
 - iv) (4) by 13-15 months
- b) FINE MOTOR SKILLS
 - i) (4) 8 months
 - ii) (2) 5-6 months
 - iii) (3) 3 months
 - iv) (1) 4 months
- c) SENSORY ABILITIES
 - i) (3) by six months
 - ii) (2) by three months
 - iii) (1) in the first week
- 2) Physical, motor and sensory development influence development in all other areas. The child's range of activity increases, she explores more and learns more. This cognitive development is fostered. She is able to interact with people and forms relationships with them. As her skills increase and she does more things, she develops positive feelings about herself. Thus social and emotional development is fostered.

Check Your Progress Exercise 3

- 1) Physical and motor development are, to a large extent, determined by maturation. Maturation determines the pattern of development. Environment influences development by providing opportunities to practise motor skills. We can thus say that heredity and environment interact to influence development of physical and motor skills.
- 2) a) True,
b) True,
c) False. The first dose of DPT, BCG and poliomyelitis drops should be given when the infant is about 3 months of age.
d) True
- 3) CHILD (A): The child is overweight and needs to lose weight as she does not fall in the area called Road-to-Safety.
CHILD (B): This child is healthy child as the line tracing her weight gain falls in the area called Road-to-Safety.
CHILD (C): In this case the child needs to gain weight and is in danger as she is not gaining weight evenly and does not fall in the area called Road-to-Safety.